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PATENT SPECIFICATION

DRAWINGS ATTACHED

Inventor: ALAN VINES

881926



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Application Date: July 9, 1959.

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COMPLETE SPECIFICATION

ERRATUM

SPECIFICATION NO. 881,926

Page 1, in the heading for "Application Date: July 9, 1959." read "Application Date: June 9, 1959."

THE PATENT OFFICE,
30th November, 1961

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15 is particularly although not exclusively applicable to such manufacture by the so-called hot-moulding rubber bag technique. Hard-chine hulls have advantages over round-bilge hulls in certain high-speed and racing craft.

20 According to the present invention in its broadest aspect, a method of making a moulded hard-chine boat hull comprises forming a round-bilged hull by a moulding process, applying a longitudinal strip, or a number of superimposed longitudinal strips, of material treated with uncured synthetic resin to the outer surface of the hull to build it up in the region where a hard-chine is required, curing the applied strip or strips to bond them to the hull, and subsequently trimming the applied strip or strips to the required hard-chine form.

30 Preferably the curing of the resin of the applied strip or strips is performed simultaneously with the moulding and curing of the hull, for example by the hot-moulding rubber bag technique in which the hull is built up of material treated with uncured synthetic resin on an internal mould and inserted in a rubber bag which is then evacuated to press the hull firmly against the moulding surfaces of the mould, the whole being then heated in an autoclave to cure the synthetic resin.

40 It will be appreciated that the hot-moulding rubber bag technique is suitable primarily for the moulding of hulls having smoothly
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One advantage of the invention is that it enables the rubber-bag hot-moulding process to be employed in the manufacture of a hard-chine diagonally-laid moulded hull. The invention is however equally applicable to other hot-moulding and cold-moulding processes for making moulded hulls.

60 According to another of its aspects, a method of making a hard-chine moulded boat hull comprises forming a round-bilge hull of resin-treated material in the uncured state on a mould, applying a longitudinal strip, or a number of superimposed longitudinal strips, of material treated with uncured resin to the outer surface of the uncured hull to build it up in the region where a hard-chine is required, curing the hull with the applied strip or strips under moulding conditions, and subsequently trimming the applied strip or strips to the required hard-chine form.

75 In one form of the invention the or each chine is built up from a number of superimposed longitudinal strips of resin-treated material which are flexible before curing.

80 The or each applied strip may be of substantially constant cross-section throughout its length before trimming.

85 The present invention also comprises hard-chine moulded boat hull made up of a round-bilge moulded shell having a longitudinal strip or several superimposed longitudinal strips of material bonded by synthetic

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COMPLETE SPECIFICATION

Improvements relating to Moulded Boat Hulls and their manufacture

We, FAIREY MARINE LIMITED, a Company registered under the Laws of Great Britain, of Cranford Lane, Heston, Hounslow, Middlesex, (formerly of North Hyde Road, Hayes, Middlesex, England, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to the manufacture of hard-chine moulded hulls for small boats from material treated with synthetic resin, and is particularly although not exclusively applicable to such manufacture by the so-called hot-moulding rubber bag technique. Hard-chine hulls have advantages over round-bilge hulls in certain high-speed and racing craft.

According to the present invention in its broadest aspect, a method of making a moulded hard-chine boat hull comprises forming a round-bilged hull by a moulding process, applying a longitudinal strip, or a number of superimposed longitudinal strips, of material treated with uncured synthetic resin to the outer surface of the hull to build it up in the region where a hard-chine is required, curing the applied strip or strips to bond them to the hull, and subsequently trimming the applied strip or strips to the required hard-chine form.

Preferably the curing of the resin of the applied strip or strips is performed simultaneously with the moulding and curing of the hull, for example by the hot-moulding rubber bag technique in which the hull is built up of material treated with uncured synthetic resin on an internal mould and inserted in a rubber bag which is then evacuated to press the hull firmly against the moulding surfaces of the mould, the whole being then heated in an autoclave to cure the synthetic resin.

It will be appreciated that the hot-moulding rubber bag technique is suitable primarily for the moulding of hulls having smoothly

rounded bilges, so that the resin-treated material can be easily layed around the curved surfaces of the mould. If the material comprises a plywood or veneer treated with a synthetic resin adhesive and layed up diagonally in superimposed skins on the mould, as in the known technique adopted by the present applicants, it will be realised that it would not be easy to bend such material accurately and without damage around the sharp angle of a hard-chine and to secure it to a correspondingly shaped mould.

One advantage of the invention is that it enables the rubber-bag hot-moulding process to be employed in the manufacture of a hard-chine diagonally-laid moulded hull. The invention is however equally applicable to other hot-moulding and cold-moulding processes for making moulded hulls.

According to another of its aspects, a method of making a hard-chine moulded boat hull comprises forming a round-bilge hull of resin-treated material in the uncured state on a mould, applying a longitudinal strip, or a number of superimposed longitudinal strips, of material treated with uncured resin to the outer surface of the uncured hull to build it up in the region where a hard-chine is required, curing the hull with the applied strip or strips under moulding conditions, and subsequently trimming the applied strip or strips to the required hard-chine form.

In one form of the invention the or each chine is built up from a number of superimposed longitudinal strips of resin-treated material which are flexible before curing.

The or each applied strip may be of substantially constant cross-section throughout its length before trimming.

The present invention also comprises hard-chine moulded boat hull made up of a round-bilge moulded shell having a longitudinal strip or several superimposed longitudinal strips of material bonded by synthetic

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resin to each outer bilge surface and trimmed to the required hard-chine shape.

5 The invention may be carried into practice in various ways but two specific embodiments will now be described by way of example with reference to the accompanying drawings, in which

10 Figure 1 is a diagrammatic cross-sectional view of a boat hull made up on a mould, with added strips to form the hard-chines,

Figure 2 is a view similar to Figure 1 showing the hull and mould inserted in a rubber bag for moulding by the hot-moulding rubber bag process,

15 Figure 3 is a view of the cured hull of Figures 1 and 2 after removal from the mould and with the additional strips trimmed to the required hard-chine shape, and

20 Figure 4 is a fragmentary sectional view of part of a modified form of hull employing solid individual hard-chine members.

In the embodiment of Figures 1 to 3, a boat hull indicated generally at 10 is made up on a mould 11 which is accurately fashioned to conform to the required internal shape of the hull, affording a flat bottom and smoothly rounded bilges. Two skins 12 of selected mahogany or Agba or like material in sheet or strip form are laid up diagonally on the mould, adjacent surfaces of the layers being coated with a waterproof synthetic-resin adhesive of a thermosetting type, and the layers being held in position temporarily on the mould, for example by stapling with hand staplers. The stem, hog, keel and transom of the hull may be attached to the hull at the same time so as to be moulded integrally into the hull.

40 Before the hull is cured on the mould however, a number of additional longitudinal strips 13 of the same material as the layers 12 are applied to the outer surface of each rounded bilge of the hull 10, the strips 13 being superimposed on one another until there is a sufficient build-up of material in the region of the bilge to enclose the required final shape of the hard-chine. Each of the strips 13 is flexible to conform to the rounded bilge shape to which the stack of strips is to be applied and comprises the same wooden veneer or other material as the layers 12, being treated with the same waterproof resin adhesive and secured by hand stapling on the bilge surface. Each strip may be of substantially constant cross-section throughout its length.

55 The mould 11 is mounted on a base plate (not shown) provided with clamping means to which a rubber bag 14 may be clamped to enclose the preformed hull on the mould 11, as illustrated in Figure 2. The mould assembly with its base plate is mounted on a trolley to facilitate its movement into an autoclave. When the rubber bag has been applied over the preformed hull 10 with its added strips 13, a vacuum of, for example, about 14

lbs. per square inch is applied to the interior of the rubber bag. The whole assembly of the mould on its base plate is now moved into the autoclave where steam heat at a temperature of up to 100° C is applied for about 70 1/2 hour, under a pressure in the autoclave of say 46 lbs. per square inch outside the rubber bag 14, thus giving a total pressure differential of about 60 lbs. per square inch across the wall of the rubber bag to force the layered hull 75 closely against the moulding surface of the mould 11 whilst the resin adhesive undergoes its initial curing. At the end of this period the mould 11 is withdrawn from the autoclave and the hull 10 is removed from the mould 80 and is left for some time for the final curing of the resin to take place before it is further worked on. After a suitable period has expired, the additional layers 13 applied to the bilges of the hull are trimmed by hand or by suitable machining operations to the required final hard-chine shape as shown in Figure 3.

It will be appreciated that this process provides a hard-chine moulded hull having rounded internal bilges affording a clean interior surface without the awkward sharp internal corner which is normal with conventionally-fabricated hard-chine hulls, and which provides a ready point at which water can penetrate the hull skin and promote rot. 95

In the modified embodiment illustrated in Figure 4, the layers 12 of veneer laid diagonally on the mould are provided at each bulge surface with a single solid longitudinal shaped strip 15 of wood or other material, which is formed with a rounded internal surface 16 shaped to conform to the external rounded bilge surface of the hull 10, the surface 16 of the strip 15 being treated with a suitable waterproof synthetic resin adhesive 105 before the strip 15 is applied to the bilge of the uncured hull. After the hull 10 with the solid strips 15 applied to its bilges has been cured, either by the hot-moulded rubber bag technique or by any other moulding process 110 such as a cold-curing moulding process, each of the solid strips 15 is trimmed externally to the required accurate hard-chine shape and to ensure that it merges smoothly at its longitudinal edges into the outer surface of the hull 115 10 to which it adheres.

Any suitable waterproof synthetic-resin adhesive may be employed for bonding together the plies of veneer to form the skin of the moulded hull, and for bonding the longitudinal strips to the bilges to form the hard chines. For example a urea resin, a resorsinal resin or a phenol-formaldehyde resin adhesive may be used. 120

WHAT WE CLAIM IS:— 125

1. A method of making a moulded hard-chine boat hull, which comprises forming a round-bilge moulded hull, applying a longitudinal strip, or in a number of superimposed longitudinal strips, of material treated with 130

uncured resin to the outer surface of the hull to build it up in the region where a hard-chine is required, curing the applied strip or strips to bond them to the hull, and subsequently trimming the applied strip or strips to the required hard-chine form.

2. A method of making a moulded hard-chine boat hull, which comprises forming a round-bilge hull of resin-treated material in the uncured state on a mould, applying a longitudinal strip, or a number of superimposed longitudinal strips, of material treated with uncured resin to the outer surface of the uncured hull to build it up in the region where a hard-chine is required, curing the hull with the applied strip or strips under moulding conditions, and subsequently trimming the applied strip or strips to the required hard-chine form.

3. A method as claimed in Claim 1 or Claim 2 in which the or each chine is built up from a number of superimposed longitudinal strips of resin-treated material which are flexible before curing.

4. A method as claimed in any one of Claims 1 to 3 in which the or each applied

strip is of substantially constant cross-section throughout its length before trimming.

5. A method as claimed in any one of the preceding claims in which the hull is moulded by the so-called rubber bag hot-moulding process.

6. A method as claimed in any one of Claims 1 to 4, in which the components of the hull are impregnated with a cold-setting synthetic resin and are cold-cured.

7. A moulded hard-chine boat hull made by the method claimed in any one of Claims 1 to 6.

8. A moulded hard-chine boat hull made up of a round-bilge moulded shell having a longitudinal strip, or several superimposed longitudinal strips, of material bonded by synthetic resin to each outer bilge surface and trimmed to the required hard-chine shape.

9. A method of making a hard-chine moulded boat hull as specifically described herein with reference to the accompanying drawings.

KILBURN & STRODE,
Chartered Patent Agents,
Agents for the Applicants.

PROVISIONAL SPECIFICATION

Improvements relating to Moulded Boat Hulls and their manufacture

We, FAIREY MARINE LIMITED, a Company registered under the Laws of Great Britain, of North Hyde Road, Hayes, in the County of Middlesex, England, do hereby declare this invention to be described in the following statement:—

This invention relates to a method of building a hard-chine boat hull by the hot moulding rubber bag technique.

Boat hulls made by this technique are usually formed on a mould which is accurately fashioned to conform to the internal shape of the hull. The mould sits on a base plate to which the rubber bag is finally clamped to ensure a good vacuum and the whole unit is mounted on a trolley for running on a track into an autoclave. Skins of selected mahogany or Agba veneer, or the like material in sheet or strip form are layered up diagonally on the mould, each layer being secured to those below by a synthetic waterproof adhesive of a type cured by heating, and held in position by for example stapling by hand staplers. The stem, hog, keel and transom may be integrally moulded into the hull at the same time.

The rubber bag is now fitted over the made up hull and a vacuum for example of approximately 60 pounds is applied inside the rubber bag. The whole assembly is now moved into the autoclave where steam heat up to for example 100° C is applied for about half an hour, after which the hull is removed from the mould and left for some time for final curing

before being worked upon.

It will be appreciated that the process referred to is suitable primarily for forming hulls with smoothly rounded bilges, around which the diagonal layers can be easily and fairly gently bent. Hard-chine hulls have advantages over round bilge hulls in certain high-speed craft but it is difficult to utilise the above process in the manufacture of such hulls because of the difficulty of bending the layers round the sharp angle of the hard-chine and it is an object of the present invention to obviate the difficulties which have hitherto prevented the manufacture of hard-chine hulls by this process.

According to the present invention in a method of making a hard-chine hull by the hot moulding rubber bag process, longitudinally extending additional layers of material treated with the resin are applied to the outer surface of the bilges of the hull before the hull is cured, and are trimmed after curing with the hull to provide the required hard-chines on the outer surface of the hull.

In a preferred arrangement each chine is built up from a number of the additional layers of material and preferably each additional layer of material is of substantially constant section throughout its length and width.

The invention also includes a hard-chine hull made by the method set forth.

The invention may be performed in various

ways but one specific embodiment will now be described by way of example.

5 The hull for a hard-chine craft is made by the usual method employed in the hot moulding rubber bag process as far as a round bilge hull is formed by the usual layers of veneer or the like and is ready to be covered by the rubber bag. Longitudinally extending additional layers of material are now applied to
10 the outer surface of the bilges of the hull until there is a sufficient build-up of material to allow it to be trimmed to form the required hard chines on the outer surface of the hull.

The rubber bag is now applied and the hull is cured by heat in the usual way. With 15 curing completed the additional layers can be trimmed to form the hard chines.

It will be appreciated that this process provides a hard-chine hull with a round internal bilge which provides a clean interior and removes the awkward sharp internal corner 20 which is normal with hard-chine hulls and which provides a ready point at which water can penetrate the hull skin and promote rot.

KILBURN & STRODE,
Agents for the Applicants.

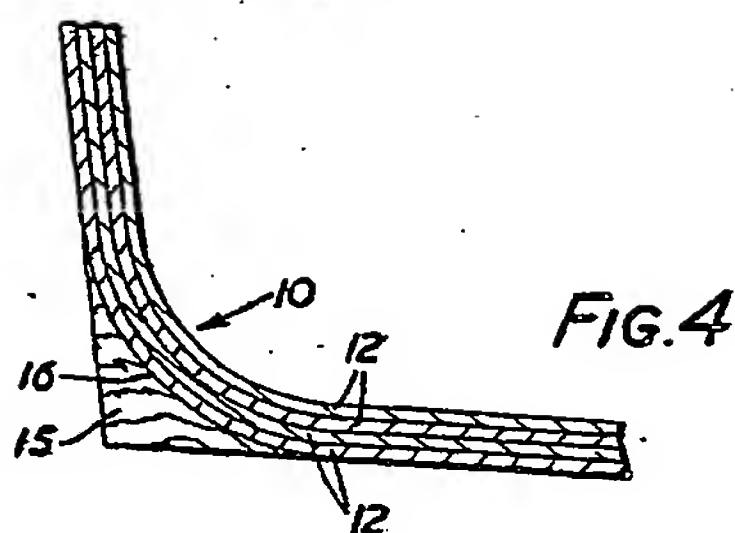
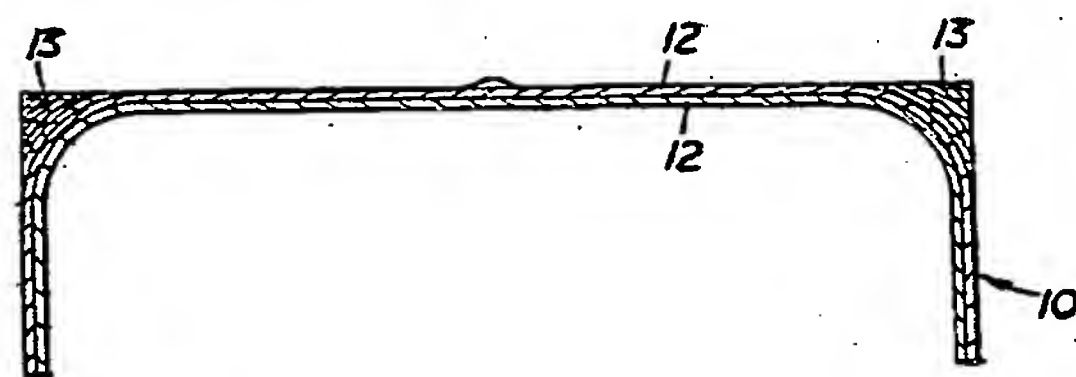
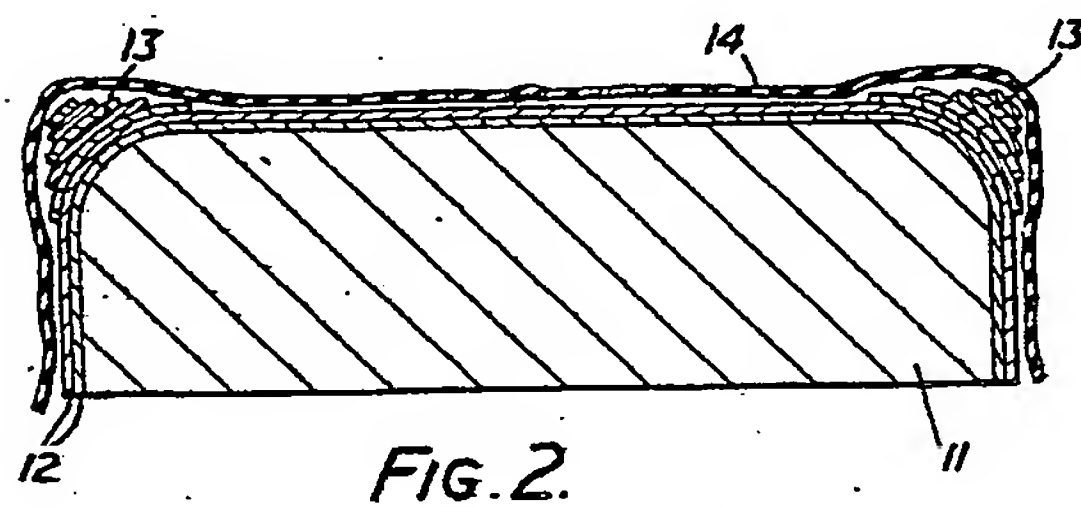
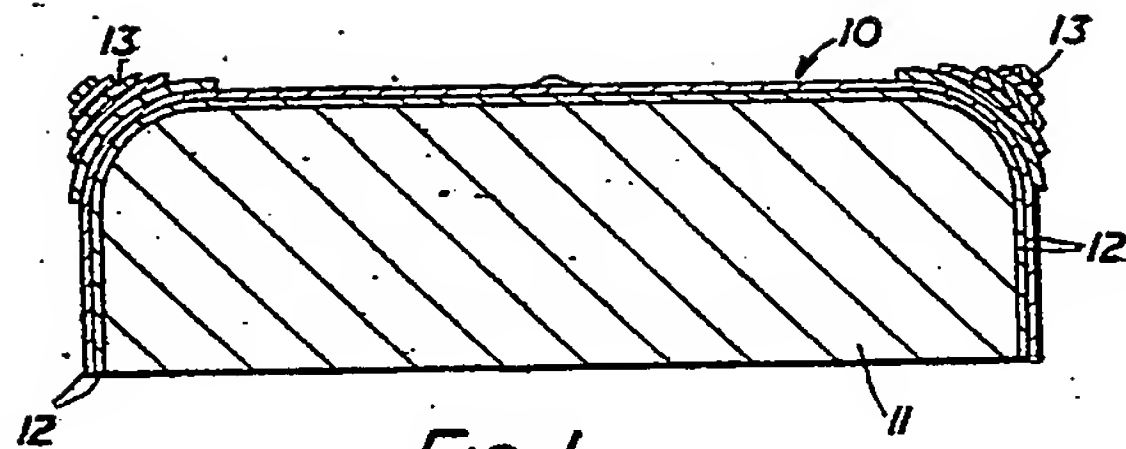
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COMPLETE SPECIFICATION

1 SHEET

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